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Picking pearls from the Silk Road: Insights into the spider (Arthropoda, Araneae) diversity in Georgia from the CaBOL project. Part I

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Abstract

Spiders collected during field trips and by spontaneous hand-collecting throughout Georgia between the years 2006 and 2022 were determined to species level and partly characterized by genetic barcoding of the COI gene. Among the resulting 51 species, two are recorded for the first time from the entire Caucasus Ecoregion: *Pireneitega armeniaca* (Brignoli, 1978) (Agelenidae) and *Leviellus caspicus* (Simon, 1889) (Araneidae). Five species are reported for the first time from Georgia: *Lycosoides coarctata* (Dufour, 1831) (Agelenidae), and from the Araneidae: *Aculepeira talishia* (Zawadsky, 1902), *Gibbaranea gibbosa* (Walckenaer, 1802), *G. omoeda* (Thorell, 1870), *Leviellus stroemi* (Thorell, 1870) and *Singa semiatra* L. Koch, 1867. Additionally, *Lycosoides lehtineni* Marusik & Guseinov, 2003 syn. nov. is synonymized with *Lycosoides coarctata* (Dufour, 1831). Diagnostic drawings and photographs are provided.

Key words

Arachnida, biodiversity, faunistics, new records, South Caucasus

Introduction

Among the 1161 spider species recorded from the Caucasus Ecoregion and the 659 species recorded from the country of Georgia (Nentwig et al. 2022; Otto 2022), the families Agelenidae, Amaurobiidae, Anyphaenidae, Araneidae and Atypidae have been the focus of numerous faunistic and taxonomic studies, which is probably due to both their abundance in the field and their medium to larger size compared to most other spiders, e.g. in the Linyphiidae. In the Agelenidae, half of the 36 species known from the Caucasus Ecoregion have also been recorded from Georgia. Besides changes in taxonomy and correction of erroneous determinations, new additions of species to the fauna of Georgia are rare; the most recent is the species *Tegenaria pseudolyncea* (Guseinov, Marusik & Koponen, 2005) from Tskhinvali (Ponomarev and Komarov 2015). Six of the eight amaurobiid species recorded in the Caucasus are known to occur in Georgia, all in the genus *Amaurobius* C. L. Koch, 1837. Two of these species, *Amaurobius antipovae* Marusik & Kovblyuk, 2004 and *A. caucasicus* Marusik, Otto & Japoshvili, 2020, had been described as new species found in Western and Eastern Georgia. Only two species of the Anyphaenidae seem to occur in the Caucasus; whereas *Anyphaena accentuata* (Walckenaer, 1802) is widely distributed throughout the region, *A. furva* Miller, 1967 is known from only two locations in the Caucasus, one of them in Central Georgia (Ponomarev and Komarov 2015). In the most species- and genus-rich family in this study, the Araneidae, 60 species have been reported from the Caucasus, 47 of them in Georgia (see Otto 2022). The only species of the Atypidae recorded from the Caucasus, *Atypus muralis* Bertkau,

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1890, has been recorded in Georgia twice, from Abkhazia (Kovblyuk et al. 2011) and Tskhinvali (Ponomarev and Komarov 2015).

With molecular methods becoming more and more standard and routine in taxonomic and ecological studies, especially through their implementation in the recent national and international barcoding initiatives, they are now being applied in the study of spiders in the Caucasus as well. The strengthening of cooperation between researchers and institutions using such methods, in Armenia, Georgia, Germany, and other countries, through the GGBC and CaBOL Projects since 2018 (Thormann et al. 2019) has yielded vast numbers of collected specimens, which are currently being processed, determined, and curated in the collections of the respective institutions. The first results on arachnids are already being published (Snegovaya 2022).

Here we present data based on the combined results of individual collecting efforts by the authors based on material collected since 2006 on several excursions and fieldtrips as well as during spontaneous collections during travels through Georgia and during stays in and around Tbilisi. Combining both traditional methods of species determination and molecular barcoding, we report species records (occurrences) as a contribution to the knowledge of the spider distribution in Georgia and the Caucasus. This includes two and five new species records for the Caucasus Ecoregion and for Georgia, respectively. It is the first of several parts, focusing here on the families Agelenidae (11 species), Amaurobiidae (2 species), Anyphaenidae (1 species), Araneidae (35 species), and Atypidae (1 species). The collecting information for each record is provided in detail, together with a discussion and remarks concerning the more interesting species and records, supported by drawings and photos of specimens and their morphological details.

Materials and methods

Sampling methods

The main part of the studied material was collected within the framework of the Caucasus Barcode of Life (CaBOL) project (https://ggbc.eu/) by the members of the GGBC (Georgian-German Biodiversity Center) and the CaBOL team. Most of the samples were collected during expeditions and short trips to different parts of Georgia (including both protected and unprotected areas) via aspirators, soil sifters, hand-collecting, and beating methods. Sampling details are given under each species listed.

Collected specimens were preserved in 96% ethanol, stored in a freezer under -22˚C at the scientific collections of Ilia State University (unique ID numbers starting with CaBOL), Zoologischen Forschungsmuseums Alexander Koenig (unique ID numbers starting with ZFMK-TIS) and the personal collection of the second author (unique ID numbers starting with KVS, KBS). Identification was done by the authors using literature sources on Caucasian spiders (see list in Otto (2022) as well as Nentwig et al. (2022)) and sources listed therein. For specimen identification, we used a Zeiss Stemi 508 Stereo Microscope with 8:1 zoom with a Zeiss Apo 1.5x FWD 53 mm front lens attached, a Zeiss Stemi SV6 with a Planapochromat 1,6x lens, the Axiocam 105 color camera, and ZEN 2 software. All drawings were made by the second author based on microscope photographs and using a Wacom Intuos Pro digital drawing tablet with the programs Krita (version 2.9.7) and Gimp (version 2.8.16). Drawings usually show the left male palpus; perspective and scale bars are given in the plates and their captions. Only Figs 22A–E and 25 (Leviellus caspicus) show the right palpus because the left palpus was missing. The photo images and drawings were flipped horizontally to represent the view of the left palpus, respectively. The preparation of the female epigyne and endogyne was done using Hoyer's solution (Otto 2015) and/or a 30% solution of Potassium Hydroxide.

All measurements are in mm. All elevations are given in meters above sea level.

Photos of preserved specimens were taken using a Canon EOS 60D camera equipped with a Canon MP-E 65mm f/2.8 1-5x Macro Photo Lens mounted on a Novoflex Castel-L Focusing Rack. Digital images were prepared using Zerene Stacker version 1.04 image stacking software and Adobe Photoshop CS6.

DNA processing

Genomic DNA was extracted from the sample tissue using the Quick-DNA Miniprep PlusKit (Zymo Research) (for 25 mg tissue). Partial sequences of cytochrome oxidase subunit I (COI) were amplified by polymerase chain reaction (PCR) using the primer pairs LCOI490-JJ and HCO2198-JJ (Astrin and Stüben 2008). Thermal conditions included denaturation at 95°C for 1 min, followed by the first cycle set (15 cycles): 94°C for 30 sec, annealing at 55°C for 1 min (–1°C per cycle) and extension at 72°C for 1:30 min. Second cycle set (25 cycles): 94°C for 35 sec, 45°C for 1 min, 72°C for 1:30 min, followed by 1 cycle at 72°C for 3 min, and final extension step at 72°C for 5 min. PCR amplicons were visualized on 1% agarose gels using 1.7 µl of PCR product. Sequencing of the unpurified PCR products in both directions was conducted at the Beijing Genomics Institute (Hong Kong, CN) by using the amplification primers. Sequence analysis was performed using Geneious Prime 2022.1.1 (http://www.geneious.com). Extracted DNA was deposited in the scientific collections of Ilia State University, Tbilisi, Georgia, while the sequences have been submitted to Barcode of Life Data Systems (BOLD) databases. The newly obtained DNA barcodes of COI sequences were checked against the BOLD Systems database (http://www.boldsystems.org/index.php). Barcode Index Number (BIN) (Ratnasingham and Hebert 2013) for the sequenced taxa and their nearest neighbor in BOLD Systems (if they had a BIN) are also given. For the calculation of sequence differentiation, we used p-distance as performed in the BOLD Systems.

Results

In total, three juveniles and 210 (sub)adult spiders (including 69 males, 141 females) were collected during the sampling period, comprising 51 species from 26 genera and five

families. The six species marked with an asterisk (*) listed below are recorded in Georgia for the first time, in addition, two species marked with a double asterisk (**) are the first records in the Caucasus.

The specimens were submitted for barcoding pipeline, and 36 quality barcodes (658 bp length barcodes, with no stop codons, indels, or deletions) representing 24 species have been generated so far. Barcode information is given under each barcoded species listed below.

List of spider species recorded

Family Agelenidae C.L. Koch, 1837

Agelena labyrinthica (Clerck, 1757)

GEORGIA • 2♂♂, 2♀♀; NE shore of Shaori Lake (Racha region); N42.42243°, E43.11075°; 1100 m a.s.l; montane meadow with pine, in webs in bushes; leg. S. Otto; 10 July 2010; ex coll. Otto (KBS 140); ZFMK-TIS 8001171-8001174 • 2♀♀; Jvari Monastery, Mtskheta; N41.83853°, E44.73446°; 600 m a.s.l.; xerothermic shrubland, in sheet web under Paliurus shrub; leg. S. Otto; 7 August 2007; coll. Otto (KBS 175).

Agelena orientalis C. L. Koch, 1837

GEORGIA • 1♂; Gamarjveba village E of Tbilisi; N41.64348°, E45.00289°; 450 m a.s.l.; in roadside shrubs in settlement; leg. S. Otto; 1 June 2007; coll. Otto (KVS 286) • 1♀; Gamarjveba village E of Tbilisi; N41.64348°, E45.00289°; 450 m a.s.l.; in roadside shrubs in settlement; leg. S. Otto; 12 August 2007; coll. Otto (KVS 288).

Eratigena agrestis (Walckenaer, 1802)

GEORGIA • 1♂; Gori; N41.9788°, E44.0960°; 584 m a.s.l.; floodplain; leg. N. Bulbulashvili; 5 September 2021; CaBOL-ID 1012416.

Genetics. The barcode of the specimen with CaBOL-ID 1012416 (BOLD:AAF8740) was identical to *E. agrestis* from Germany (BOLD:AAF8740) in BOLD Systems.

Remarks. The location fits well with the distribution pattern in Georgia – the nearest other records are from Adigeni and Tskhinvali (Mcheidze 1997; Ponomarev and Komarov 2015).

**Lycosoides coarctata* (Dufour, 1831)

GEORGIA • 1♂; Tbilisi; N41.769750°, E44.766169°; 455 m a.s.l.; in park; leg. A. Seropian; 02 November 2019; ex coll. Otto (KVS 549); CaBOL-ID 1004103 • 1♀; Tbilisi; N41.7690°, E44.7662°; 425 m a.s.l.; heathland, under construction material; leg. A. Seropian; 2 November 2019; ex coll. Otto (KVS 573); CaBOL-ID 1004221 • 1♀; Tbilisi; N41.76805°, E44.76343°; 450 m; colline, in heap of rubbish; leg. A. Seropian; 16 October 2020; coll. Otto (KVS 575); CaBOL-ID 1004223.

Genetics. We obtained two barcodes from the specimens with CaBOL-IDs 1004221, 1004223 (BOLD:AAY5211), both with identical COI sequences. The nearest neighbor in BOLD Systems is *L. coarctata* from Egypt (BOLD:AAY5211, similarity % = 100).

Remarks. *L. coarctata* has been recently recorded in the Caucasus from Azerbaijan (Nurueva 2022), and our record is the first in Georgia. The morphology of both males corresponds well with the key and drawings provided by Nentwig et al. (2022). We failed to yield a good sequence from the female with CaBOL-ID 1004103, the morphology of which corresponds better to other species of the genus *L. lehtineni* Marusik & Guseinov, 2003 described from Azerbaijan based on a single female. Based on the information, that no males of *L. lehtineni* are known to date, the minor differences in epigyne structures of these two nominal species (Marusik and Guseinov 2003), and the extreme proximity of the examined males and female sampling sites, we propose *L. lehtineni* to be a junior synonym of *L. coarctata*, with differences in genitalia structure that fit within intraspecific variation (a very similar epigyne). *Lycosoides lehtineni* can be recognized by having a shorter and broader septum that is not widened at the top, height of the fovea greater than that of the basal part (the opening is subequal in height to the basal part of the epigyne in *L. coarctata* (Marusik and Guseinov 2003)).

Persiscape caucasica (Guseinov, Marusik & Koponen, 2005)

GEORGIA • 1♀; SW of Gori; N41.97198°, E44.09705°; 720 m a.s.l.; montane, xerothermic slope; leg. N. Bulbulashvili; 3 November 2019; ex coll. Otto (KVS 548); CaBOL-ID 1004102 • 3♀♀; Kodistskaro NW of Igoeti (Shida Kartli region); N42.0258°, E44.3613°; 770 m a.s.l.; steppe; leg. N. Bulbulashvili; 25 August 2021; CaBOL-IDs 1012359, 1012371, 1012384 • 1♀, Gori; N41.9780°, E44.0964°; 747 m a.s.l.; steppe; leg. N. Bulbulashvili, 17 August 2021; CaBOL-ID 1012410.

Remarks. After this species had been recorded from Azerbaijan (Guseinov et al. 2005) and Tbilisi (Pkhakadze 2006), our records extend the known distribution range in Georgia further South-West beyond Pia.

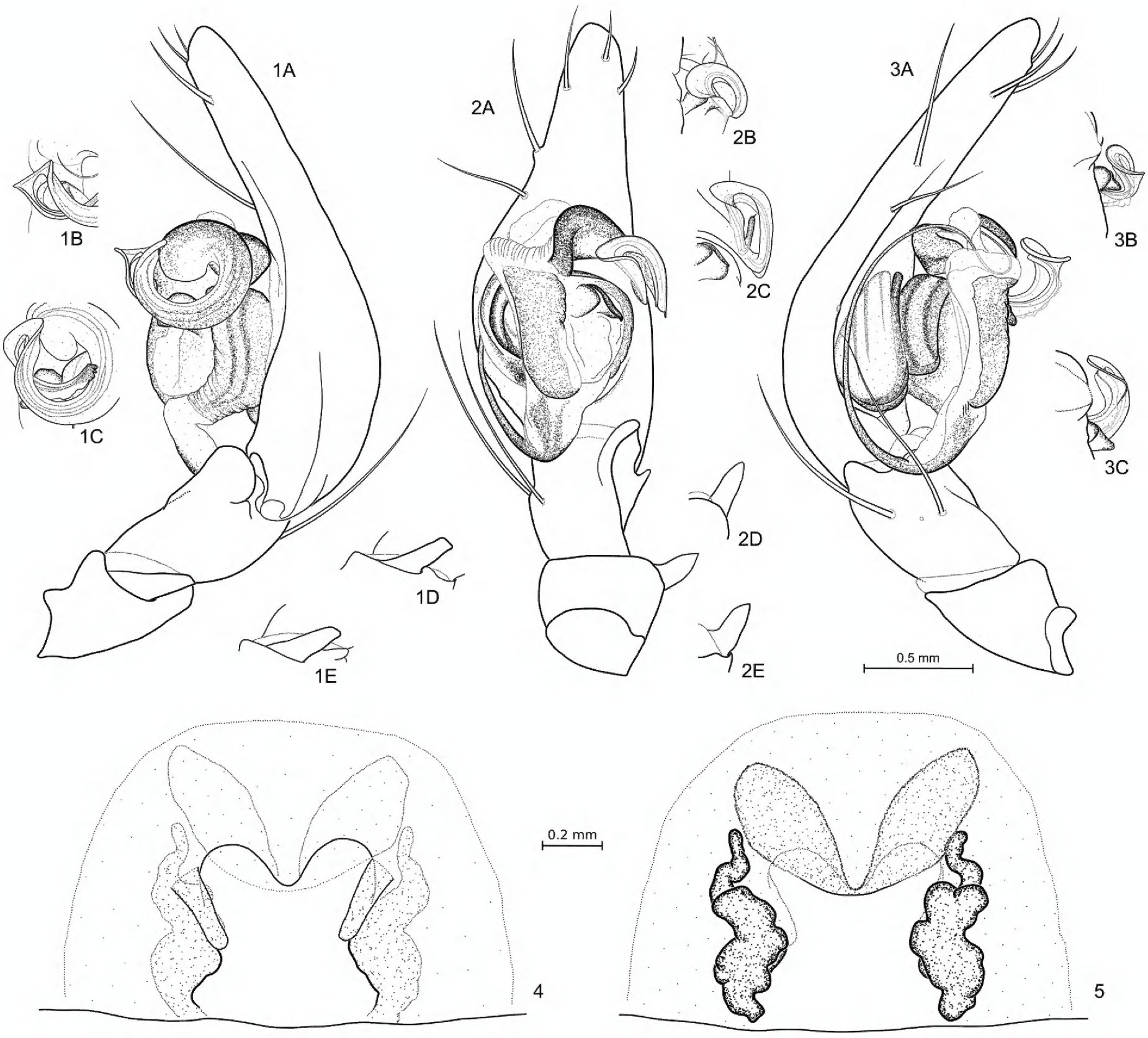
Persiscape gideoni (Levy, 1996)

Agelescape dunini Guseinov, Marusik & Koponen, 2005

GEORGIA • 1♂; SW of Gori; N41.971333°, E44.095306°; 758 m a.s.l.; xerothermic slope, montane; 8 December 2019 (adult 6. February 2020); leg. N. Bulbulashvili; ex coll. Otto (KVS 547); CaBOL-ID 1004101 • 1♀; Pia (Samtskhe-Javakheti region); N41.4370°, E43.3078°; 1222 m a.s.l.; steppe, under rock; 10 December 2021; leg. N. Bulbulashvili; CaBOL-ID 1018778.

Genetics. We obtained four barcodes from the specimens with CaBOL-IDs 1012359, 1012371, 1012384, 1012410, (BOLD:AFB7576), 1018778 (BOLD:AFB7575), all with nearly identical CO1 sequence (0-0.16% p-dist). The nearest neighbor in BOLD Systems is *A. gideoni* from Iran (BOLD:AEB5791, mean p-dist. 6.2%).

Remarks. The examined specimens correspond to the drawings, keys and descriptions provided by Levy (1996), Zamani and Marusik (2020) and Nentwig et al. (2022). It is



Figures 1–5. Agelenidae, *Pireneitega armeniaca*; **1A**: left palpus; **1B**: tip of the conductor of the left palpus, retrolateral view; **1C**: conductor of the left palpus, retrolateral view; **1D**,**E**: variation of patellar apophysis of the left palpus, retrolateral view; **2A**: left palpus, ventral view; **2B**,**C**: variation of the tip of conductor of the left palpus, ventral view; **2D**,**E**: Variation of the patellar apophysis of the left palpus, ventral view; **3A**: prolateral view of the left palpus; **3B**,**C**: variation of the tip of the conductor of the left palpus, prolateral view; **4**: epigyne, ventral view; **5**: endogyne, dorsal view.

questionable whether the specimen in BOLD has been correctly identified, or if the COI DNA is an appropriate tool for determining *P. gideoni*. After this species had been recorded from Azerbaijan (Guseinov et al. 2005) and Tbilisi (Pkhakadze 2006) under the name *Agelescape dunini*, our records extend the known distribution range further West beyond Gori and South-West beyond Pia, increasing the known maximum elevation to 1200–1300 m a.s.l. in the Caucasus.

***Pireneitega armeniaca* (Brignoli, 1978)

GEORGIA • 1♀; Kintrishi National Park; N41.7608°, E41.9784°; 1700 m a.s.l.; forest, in pitfall trap; leg. G. Chaladze; 25 August 2018; coll. Otto (KVS 507) • 1♀; Kintrishi National Park; N41.7477, E42.0951; 1637 m a.s.l.; forest edge; malaise trap; leg. CaBOL team; 5 October 2018; CaBOL-ID 1012737 • 3♂♂, 2♀♀; Kintrishi National Park; N41.7608°, E41.9784°; 2400 m a.s.l.; forest, in pitfall trap; leg. G. Chaladze; 25 August 2018; coll. Otto (KVS 509 (males) (Figs 1–3), KBS 334 (females) (Figs 4–5).

Remarks. See *Pireneitega spasskyi* below.

Pireneitega spasskyi (Charitonov, 1946)

GEORGIA • 1♀; Dariali Gorge, Stepantsminda; N42.7361°, E44.6387°; 1460 m a.s.l.; Khde River bank, under rock; leg. L. Mumladze; 5 July 2019; CaBOL-ID 1012736 • 1♂, 1♀; Matura Valley (Pshavi region); N42.48480°, E45.10867°; 2800 m a.s.l.; alpine grassland, under rock; leg. S. Otto; 23 July 2007; coll. Otto (KVS 72, KBS 33) • 1♀; E of Mravaldzali (Racha region); N42.51027°, E43.35083°; 1900 m a.s.l.; leg. F. Walther; 9 October 2011; coll. Otto (KBS 148) • 1♀; Ninigori Mtn. in Lagodekhi National Park; N41.88971°, E46.29066°; 2100 m a.s.l.; alpine grassland, under rock; leg. S. Otto; 31 March 2009; coll. Otto (KBS 193) • 1♀, Bakuriani (Trialeti

Mountains); N41.74874°, E43.52776°; 2100 m a.s.l.; leg. F. Walther; 17 September 2011; coll. Otto (KBS 160) • 3♀♀; Mitarbi near Bakuriani (Trialeti Mountains); N41.7465°, E43.58057°; 1700 m a.s.l.; montane forest; leg. S. Otto; 22 August 2007; coll. Otto (KBS 115) • 1♀; Madatapa Managed reserve (Samtskhe-Javakheti region); N41.1968°, E43.7587°; 2128 m a.s.l.; meadow, under rock; leg. N. Bulbulashvili; 11 October 2021; CaBOL-ID 1018765.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1018765 (BOLD:AFB6734) with the nearest neighbor in BOLD Systems being *P. spasskyi* (BOLD:AEL0929, p-dist. 3.91%).

Remarks. The morphology of the specimens collected in the mountains of the Greater Caucasus and the Trialeti Mountains/Samtskhe-Javakheti corresponds well with *P. spasskyi*, as does the barcode of the specimen from Samtskhe-Javakheti in the Lesser Caucasus with CaBOL-ID 1018765. However, the specimens collected in the Meskheti Mountains near the Black Sea Coast (Kintrishi National Park) exhibit differences in the morphology of the copulatory organs, resembling *P. armeniaca* (Brignoli, 1978) much better than *P. spasskyi*. We, therefore, report *P. armeniaca* for the first time from Georgia, extending the known range of this species northward from the region between Trabzon, Artvin and Şavşat in NE Turkey (Brignoli 1978). In order to facilitate future research on both species and elaborate on the variation of morphology, we added details of the palpus structures of three specimens of *P. armeniaca* from Kintrishi (Figs 1–3) as well as the epigyne and endogyne structure of the female genital structures (Figs 4–5).

Tegenaria chumachenkoi Kovblyuk & Ponomarev, 2008

GEORGIA • 1♂, 1♀; Gori, near Mtkvari River; N41.981912°, E44.091087°; 588 m a.s.l.; in webs inside the holes at the river bank; leg. N. Bulbulashvili; 1-3 October 2020; CaBOL-IDs 1035510, 1035511 • 1♀; Gori; N41.9788°, 44.0960°; 584 m a.s.l.; floodplain; leg. N. Bulbulashvili; 3 December 2021; CaBOL-ID 1011129 • 1♀; Nedzvi Managed Reserve; N41.9010°, 43.5157°; 902 m a.s.l.; meadow at coniferous forest, under rock; leg. N. Bulbulashvili; 10 October 2022; CaBOL-ID 1032755 • 1♂; Didgori; N41.7871°, E44.6764°; 816 m a.s.l.; deciduous forest, under rock; leg. A. Seropian; 21 September 2021; CaBOL-ID 1011135.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1011129 (BOLD:AFB7276). This species is not present in BOLD at the moment, as we are providing the first COI sequences. The nearest neighbor in BOLD Systems is *T. silvestris* L. Koch, 1872 from Germany (BOLD:ACX0495, p-dist. 8.56%).

Remarks. This species is known from a number of locations in the NW Caucasus and the Samachablo region (Kovblyuk and Ponomarev 2008; Kovblyuk et al. 2011; Ponomarev et al. 2012; Ponomarev and Komarov 2015; Ponomarev and Shmatko 2022). Our records from Gori and Didgori (Tbilisi) are the second records of this species from Central Georgia, close to the record by Ponomarev and Komarov (2015) from the Samachablo region.

Tegenaria domestica (Clerck, 1757)

GEORGIA • 2♂♂, 2♀♀; David Gareja Monastery; N41.44088°, E45.37847°; 700 m a.s.l.; in sheet webs in cellar; leg. S. Otto; 30 July 2013; coll. Otto (KBS 109) • 1♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00289°; 450 m a.s.l.; pseudosteppe garden; leg. T. Shetekauri; 1 June 2008; coll. Otto (KBS 189).

Tegenaria longimana Simon, 1898

GEORGIA • 1♂; Kintrishi National Park; N41.72866°, E42.07702°; 970 m a.s.l.; beech-chestnut forest, in litter; leg. S. Otto; 3 June 2009; coll. Otto (KVS 473).

Remarks. This species has been recorded from numerous locations in the Colchic basin, mostly at very low elevations (Otto 2022). Our record is the second-highest in the Caucasus (see Kovblyuk and Ponomarev 2008). Palpus morphology corresponds well to *T. longimana* (see Suppl. material 1).

Family Amaurobiidae Thorell, 1869

Amaurobius caucasicus Marusik, Otto & Japoshvili, 2020

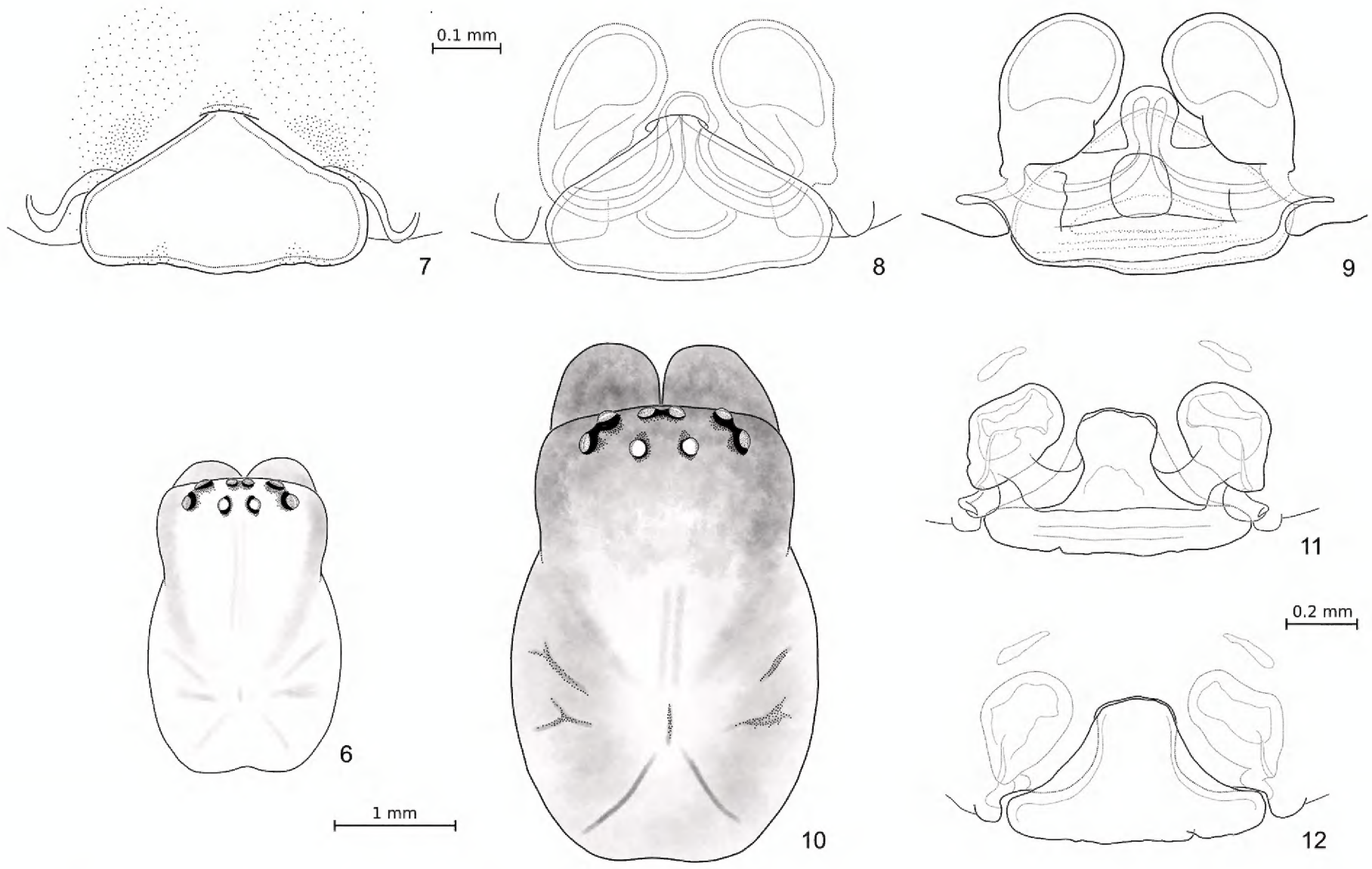
GEORGIA • 1♂; Nedzvi Managed Reserve; N41.9010°, 43.5157°; 902 m a.s.l.; meadow at coniferous forest, under rock; leg. N. Bulbulashvili; 10 October 2022; CaBOL-ID 1032061.

Remarks. This is the first record of this species from the Samtskhe-Javakheti region and outside its type locality in Lagodekhi National Park (Marusik et al. 2020).

Amaurobius similis (Blackwall, 1861)

GEORGIA • 1♀; Kvelaantubani in Trialeti Mountains SW of Gori; N41.85348°, E43.86911°; 1300 m a.s.l.; leg. F. Walther; 16 September 2011; coll. Otto (KVS 310) (Figs 10–12) • 3♀♀; Near Kojori (Trialeti Mountains); N41.67450°, E44.6992°; 1400 m a.s.l.; xerothermic montane shrubland, in litter near pines; leg. S. Otto; 12 May 2009; two females coll. Otto (KVS 390a, KVS 390b) (Figs 6–9), one female CaBOL-ID 1004108.

Remarks. At first, we could not match the specimens from Kojori with any of the *Amaurobius* species reported from the Caucasus and surrounding regions, neither morphologically nor genetically, because DNA extraction was not successful. A detailed comparison of the habitus and genital characters of the specimens from Kojori (Figs 6–9) to the specimen from Kvelaantubani (Figs 10–12) suggests, however, that they indeed belong to *A. similis*, despite some obvious variation in genital structure, less distinct coloration, and body size – only 63–71% of the size of the specimen from Kvelaantubani (see supplementary information). The habitus was very similar: prosoma clay-colored with a somewhat darker and raised eye region. Chelicerae brown (dark contrast to carapace and ventral side), gnathocoxae and labium brown, sternum yellow, and ventral coxae a light clay color. Opisthosoma gray, its anterior shoulder light gray, bearing an inconspicuous gray



Figures 6–12. Amaurobiidae, *Amaurobius similis*; prosoma (**6, 10**: dorsal view), epigyne (**7**, **12**: ventral view, in situ; **8**: ventral view, prepared), endogyne (**9**, **11**: dorsal view).

cardiac mark (see Suppl. material 1). Cribellum bipartite, calamistrum in a single row. Such a strongly developed size dimorphism has already been reported for another Caucasian species, *A. antipovae* Marusik and Kovblyuk, 2004 (Marusik et al. 2020). Due to the morphological variation, the obvious similarities between both species and the scarcity of specimens available for study, we recommend the additional collection of specimens for further morphological and genetic evaluation.

Family Anyphaenidae Bertkau, 1878

Anyphaena accentuata (Walckenaer, 1802)

GEORGIA •1♀; Shilda; N45.7162°, E42.0043°; 513 m a.s.l.; in settlement, malaise trap; leg. GGBC/CaBOL Team; 24 April – 01 May 2021; CaBOL-ID 1012835 • 1♀, 1♂; Aniskhevi; N42.0830°, E45.3004°; 1022 m a.s.l.; meadow; leg. CaBOL_team; 30 May 2022; CaBOL-IDs 1031230, 1031231 • 1♀(subadult); Patara Dmanisi; N41.3391°, E44.3476°; 835m a.s.l.; Mashavera River bank; leg. E. Arsenashvili; 25 October 2022; CaBOL-ID 1032222.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1032222 (BOLD:AAO3252) identical in BOLD Systems to COI of *A. accentuata* from Turkey, Finland, and Bulgaria (BOLD:AAO3252).

Family Araneidae Clerck, 1757

Aculepeira armida (Audouin, 1826)

GEORGIA • 3♀♀, 2♂♂; Juta village (Stepantsminda); N42.5786°, E44.7459°; 2198 m a.s.l.; 20 July 2022; leg. L.-G. Japaridze; CaBOL-IDs 1028023, 1028024, 1028025, 1028026, 1028027.

**Aculepeira talishia* (Zawadsky, 1902)

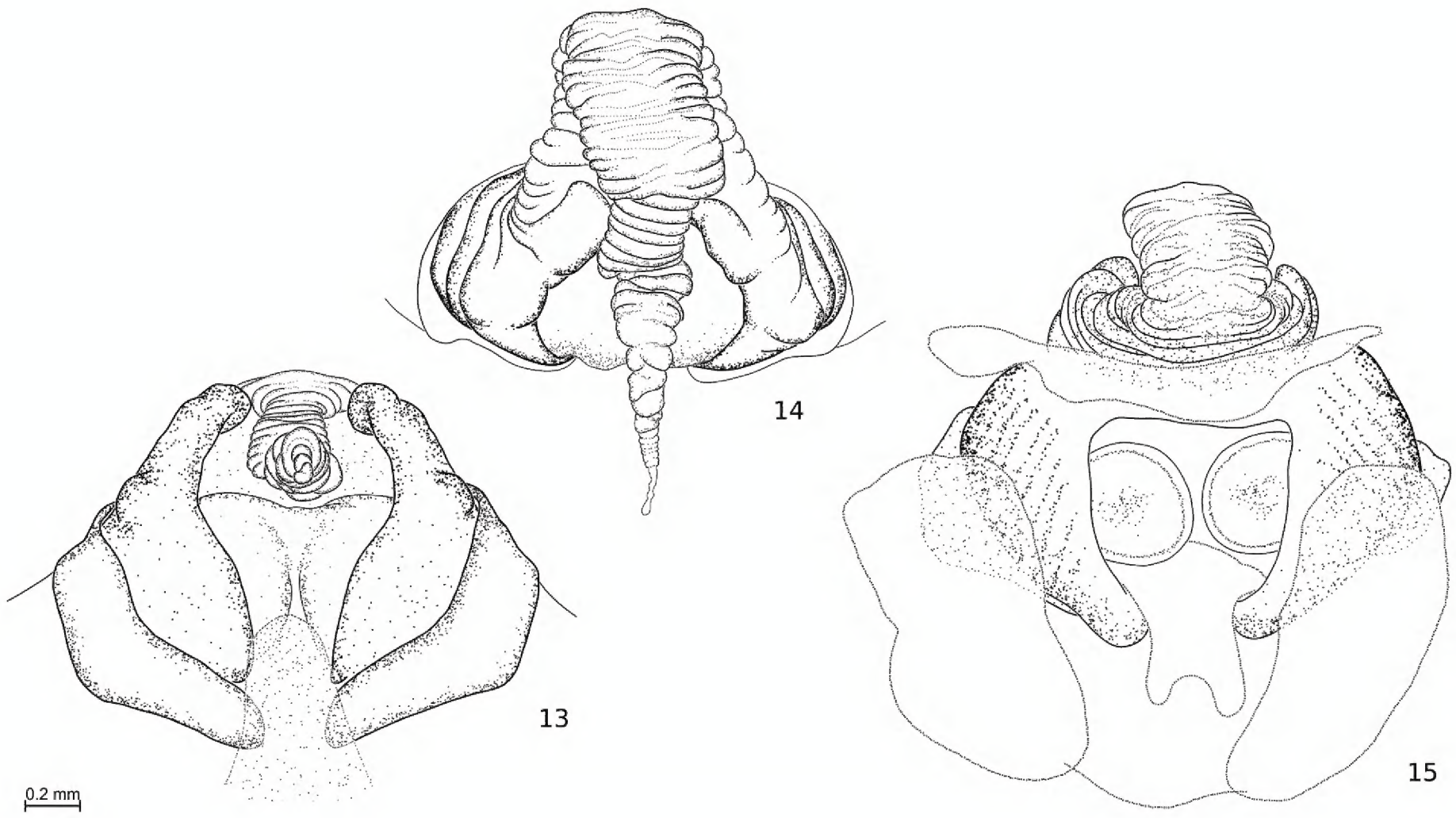
GEORGIA • 1♀; Tabatskuri Lake (Samtskhe-Javakheti region); N41.64434°, E43.59848°; 2000 m a.s.l.; 25 September 2020; leg. N. Melikishvili; ex coll. Otto (KVS 571); CaBOL-ID 1004219 (Figs 13–15) • 1♀; East of Tabatskuri Lake (Samtskhe-Javakheti region); N41.6465°, E43.7300°; 2800 m a.s.l.; 21 June 2021; leg. A. Sanakoeva, G. Iankoshvili, B. Chitadze; CaBOL-ID 1004250 • 1♂; East of Tabatskuri Lake (Samtskhe-Javakheti region); N41.6465°, E43.7300°; 2800 m a.s.l.; 21 June 2021; leg. A. Sanakoeva, G. Iankoshvili, B. Chitadze; CaBOL-ID 1004249.

Genetics. We obtained two barcodes from the specimens with CaBOL-IDs 1004249, 1004250 (BOLD:AAP8817), both with identical COI sequences. Identification via CO1 subunit barcode is not straightforward as *A. talishia* and its nearest neighbor in BOLD Systems, *A. ceropegia* (Walckenaer, 1802) from Sweden (BOLD:AAP8817), differ only 1.22% p-dist.

Remarks. A detailed study revealed the species identity as *A. talishia*, a species that has been recorded from the Caucasus before, from Karachay-Cherkessia and the Talysh (Guseinov 1999; Martynovchenko and Mikhailov 2014). Our records are the first in Georgia.

Aculepeira ceropegia (Walckenaer, 1802)

GEORGIA • 1♂; Matura (Pshavi region); N42.44441°, E45.07033°; 1500 m a.s.l.; montane grassland; leg. S. Otto; 21 July 2007; coll. Otto (KVS 58) • 1♀; Tskhratskaro (Nine-Springs Pass) S of Bakuriani; N41.68852°, E43.51466°; 2000 m a.s.l; near road; leg. S. Otto; 12 August 2007; coll. Otto (KBS 125) • 1♀; Kartsakhi; N41.1926°, E43.2411°; 1822 m a.s.l.; subalpine meadow,



Figures 13–15. Araneidae, *Aculepeira talishia*; epigyne (**13**: caudal view, prepared; **14**: ventral view, in situ; **15**: frontal view, prepared).

swept from vegetation; leg. L.-G. Japaridze; 05 July 2022; CaBOL-ID 1030830.

Agalenatea redii (Scopoli, 1763)

GEORGIA • 1♀; Mijniskure (Vashlovani National Park); N41.1118°, E46.6463°; 94 m a.s.l.; meadow at Alazani River bank, on vegetation; leg. A. Seropian; 17 April 2021; CaBOL-ID 1010348.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1010348 (BOLD:AAD4170) with the nearest neighbor in BOLD Systems being *A. redii* from Germany (BOLD:AAD4170, 0.31% p-dist.).

Remarks. Although *A. redii* is one of the most common species not only in Georgia but in the whole Caucasus, our specimen represents the first record from the Kakheti region.

Araneus angulatus Clerck, 1757

GEORGIA • 2♀♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; roadside in settlement, in shrub; leg. S. Otto; 8 September 2006; coll. Otto (KVS 14) • 3♀♀; same location; 12 August 2007; coll. Otto (KBS 130) • 1♀; Jvari Monastery, Mtskheta; N41.83853°, E44.73446°; 600 m a.s.l.; montane xerothermic shrubland, on Paliurus shrub; leg. S. Otto; 7 August 2007; coll. Otto (KBS 173) • 1juv.; Kotsakhuraskhevi gorge (Kaspi); N41.95814°, E44.38067°; 648 m a.s.l.; meadow, leg. K. Kereselidze; 16 May 2022; CaBOL-ID 1025999.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1025999 (BOLD:ACE8477) with the nearest neighbor in BOLD Systems being *A. angulatus* from Slovenia (BOLD:ACE8477, p-dist. 0.15%).

Araneus circe (Audouin, 1826)

GEORGIA • 6♀♀, Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; in settlement in pseudosteppe habitat; leg. S. Otto; 24 August 2007; coll. Otto (KVS 290).

Araneus diadematus Clerck, 1757

GEORGIA • 1♀; Mitarbi near Bakuriani; N41.74650°, E43.58057°; 1700 m a.s.l.; montane forest; leg. S. Otto; 22 August 2007; coll. Otto (KBS 124) • 1♀; Inguri Valley between Ushguli and Bogreshi (Upper Svaneti); N43.01121°, E42.82935°; 1600 m a.s.l.; montane roadside habitat; leg. S. Otto; 20 August 2011; coll. Otto (KBS 141) • 1♀; vicinity of Tmogvi near Vardzia (Samtskhe-Javakheti region); N41.38222°, E43.29750°; 1200 m a.s.l.; leg. F. Walther; 19 September 2011; coll. Otto (KBS 146) • 1♀; at Taleri village in Tekhuri Valley (Samegrelo); N42.59889°, E42.34972°; 400 m a.s.l.; leg. F. Walther; 10 October 2011; coll. Otto (KBS 149) • 1♀; Abastumani near the observatory; N41.75377°, E42.81951°; 1600 m a.s.l.; leg. F. Walther; 28 October 2011; coll. Otto (KBS 158).

Araneus grossus (C. L. Koch, 1844)

GEORGIA • 1♂; Kverkanki Ridge (Gori); N41.9865°, E44.1709°; 670 m a.s.l.; heathland, on vegetation; leg. N. Bulbulashvili; 10 May 2022; CaBOL-ID 1026393 • 1juv.; Damala Village; N41.5726°, E43.3140°; 1721 m a.s.l.; meadow at *Quercus* sp. forest, on vegetation; leg. N. Bulbulashvili; 12 October 2022; CaBOL-ID 1032738.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1026393 (BOLD:AFB6958) with the nearest neighbor in BOLD Systems being *A. angulatus*

from Turkey (BOLD:AAI4459, p-dist. 10.55%). The only available barcode of "*A. grossus*" from Spain with a Private status undoubtedly belongs to *A. angulatus* given its genetic proximity to other conspecifics in BOLD Systems and the photo of the specimen, as we submit the very first sequence of *A. grossus*.

Araneus marmoreus Clerck, 1757

GEORGIA • 1♂; Matura (Pshavi region); N42.44441°, E45.07033°; 1500 m a.s.l.; montane meadow; leg. S. Otto; 21 July 2007; coll. Otto (KVS 60).

Araneus quadratus Clerck, 1757

GEORGIA • 1♂; Matura (Pshavi region); N42.44441°, E45.07033°; 1500 m a.s.l.; montane meadow; leg. S. Otto; 21 July 2007; coll. Otto (KVS 59) • 1♂; Tabatskuri Lake (Samtskhe-Javakheti region); N41.64434°, E43.59848°; 2000 m a.s.l.; meadow in montane pine plantation; leg. S. Otto; 21 August 2007; coll. Otto (KBS 126) • 1♀; Lagodekhi National Park; N41.86298°, E46.34377°; 1900 m a.s.l.; subalpine meadow; leg. G. Bananashvili; 8 August 2020; coll. Otto (KBS 371) • 1♀; Bareti Lake Managed Reserve; N41.6525°, E44.1652°; 1640 m a.s.l.; meadow, on vegetation; leg. N. Bulbulashvili; 11 October 2021; CaBOL-ID 1018812.

Genetics. The sequence obtained from the specimen with CaBOL-ID 1018812 (BOLD:AAO2570) is identical to the sequence of *A. quadratus* from Germany (BOLD:AAO2570).

Remarks. Although *A. quadratus* is one of the most common species in Georgia and the Great Caucasus, our specimens from Tabatskuri Lake and Bareti Lake Managed Reserve represent the first records from the Samtskhe-Javakheti and Kvemo Kartli regions, respectively.

Araneus sturmi (Hahn, 1831)

GEORGIA • 1♂; Nakerala Ridge (Racha region); N42.38522°, E42.98487°; 1400 m a.s.l.; on tree branches in beech-fir forest; leg. S. Otto; 10 July 2010; coll. Otto (KVS 342).

Araniella cucurbitina (Clerck, 1757)

GEORGIA • 1♂, 1♀; Matura Valley (Pshavi region); N42.46686°, E45.09244°; 2000 m a.s.l.; montane meadow; leg. S. Otto; 22 July 2007; coll. Otto (KVS 67, KVS 68) • 1♂; Bakuriani Train Station (Trialeti Mountains); N41.75456°, E43.52424°; 1700 m a.s.l.; on pavement; leg. S. Otto; 24 July 2010; coll. Otto (KBS 177) • 1♂; Kartsakhi; N41.1926°, E43.2411°; 1822 m a.s.l.; subalpine meadow, swept from vegetation; leg. L.-G. Japaridze; 05 July 2022; CaBOL-ID 1030846.

Argiope bruennichi (Scopoli, 1772)

GEORGIA • 1♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; in pseudosteppe garden; leg. S. Otto; 29 August 2006; coll. Otto (KVS 11) • 1♀; David Gareja Monastery; N41.44717°, E45.37503°; 700 m a.s.l.; rock crevices in steppe; leg. S. Otto; 20 July 2006; coll. Otto (KBS 171) • 1♀; Jvari Monastery, Mtskheta; N41.83853°, E44.73446°; 600 m a.s.l.; xerothermic shrubland, in Paliurus shrub; leg. S. Otto; 7 August 2007; coll. Otto (KBS 174) • 1♂; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; in house; leg. S. Otto; 13 July 2010; coll. Otto (KVS 324).

Argiope lobata (Pallas, 1772)

GEORGIA • 1♀; S of Lake Nadarbazevi E of Gori; N41.97820°, E44.28510°; 950 m a.s.l.; leg. G. Iankoshvili; 13 September 2020; ex coll. Otto (KVS 564); CaBOL-ID 1004216.

Genetics. A single sequence obtained from the specimen with CaBOL-ID 1004216 (BOLD:AAZ8817) had the best match in GenBank with *A. lobata* from Spain (KJ957971.1, 3.04% p-dist.).

Cercidia prominens (Westring, 1851)

GEORGIA • 1♀; Ispani II wetland near Kobuleti (Adjara region); N41.86339°, E41.78367°; 6 m a.s.l.; Sphagnum bog, in the field layer; leg. S. Otto; 22 May 2009; coll. Otto (KVS 413) • 3♀♀; Tbilisi (Dighomi urban-forest); N41.7695°, E44.7737°; 426 m a.s.l.; meadow, on vegetation near the ground; leg. N. Bulbulashvili; 15 September 2021; CaBOL-IDs 1012560, 1012561, 1012562 • 2♀♀, 1♂; Gori; N41.7695°, E44.7737°; 588 m a.s.l.; floodplain at Mtkvari River, in leaf litter; leg. N. Bulbulashvili; 24. October 2022; CaBOL-IDs 1031220, 1031221, 1031222 • 1♀; Aniskhevi; N42.0830°, E45.3004°; 1022 m a.s.l.; meadow; leg. CaBOL_team; 30 May 2022; CaBOL-ID 1031228.

Genetics. We obtained three barcodes from the specimens with CaBOL-IDs 1012560, 1012561, 1012562 (BOLD:AAN3257) all with identical COI sequences. The nearest neighbor in BOLD Systems is *C. prominens* from Finland (BOLD:AAN3257, p-dist. 0.93%).

Remarks. Since the first report of the species from Abkhazia (Kovblyuk et al. 2011) our specimens represent the second record from Georgia. These small araneids are mainly found near or at ground level.

Cyclosa conica (Pallas, 1772)

GEORGIA • 1♀; Chakvistavi, Mtirala National Park (Adjara region), 1 km E of visitor center; N41.67632°, E41.87472°; 300 m a.s.l.; river bed, in ferns; leg. S. Otto; 7 July 2010; coll. Otto (KVS 338) • 1♂; Zeraboseli, Kintrishi National Park; N41.73701°, E41.98446°; 400 m a.s.l.; in forest, field layer; leg. S. Otto; 2 June 2009; coll. Otto (KVS 422) • 2♀♀; Gori; N42.2240°, E45.3004°; 817 m a.s.l.; meadow at deciduous mixed forest; leg. N. Bulbulashvili; 28 May 2022; CaBOL-IDs 1025738, 1025739 • 1♀; Batsara Nature Reserve; N42.0722°, E45.3900°; 431 m a.s.l.; meadow at deciduous mixed forest; leg. CaBOL Team; 27 May 2022; CaBOL-ID 10301235.

Figures 16–17. Araneidae, *Gibbaranea gibbosa*; dorsal habitus (**16**: female; **17**: male).

Cyclosa sierrae Simon, 1870

GEORGIA • 1♂; Gori; N41.9806°, E44.0790°; 616 m a.s.l.; steppe; leg. N. Bulbulashvili; 8 May 2022; CaBOL-ID 1026367.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1026367 (BOLD:AAC0925) with the nearest neighbor in BOLD Systems *C. sierrae* from Turkey with an Early-Release status (p-dist. 0.15%); the second-best match is another *C. sierrae* from Turkey (BOLD:AAC0925, p-dist. 0.92%).

Gibbaranea bituberculata (Walckenaer, 1802)

GEORGIA • 1♂; David Gareja Monastery; N41.44942°, E45.37903°; 900 m a.s.l; Northern slope of rock formation, under rock; leg. S. Otto; 29 March 2009; ex coll. Otto (KVS 360); CaBOL-ID 1004113 • 1♀; Tbilisi; N41.7706°, E44.7671°; 439 m a.s.l.; steppe, on vegetation; leg. N. Bulbulashvili; 15 May 2022; CaBOL-ID 1023919.

Genetics. We obtained a single barcode from the specimen with CaBOL-ID 1023919 (BOLD:AAD3252) identical in BOLD Systems to the COI of *G. bituberculata* from Slovenia (BOLD:AAD3252).

**Gibbaranea gibbosa* (Walckenaer, 1802)

GEORGIA • 1♂,1♀; Kiketi; N41.6402°, E44.64888°, 1136 m a.s.l.; deciduous forest, on twigs; leg. A. Seropian; 1 November 2020 (male adult 5 December, female adult 1 December); CaBOL-IDs 1035487 (Figs 17-18), 1035488 (Figs 16, 19).

Remarks. This species has been recorded in Azerbaijan and Armenia before (Dunin 1989; Zarikian and Kalashian 2021). Our records are the first for Georgia (Figs 16–19), Suppl. material 1) and only the third in the Caucasus after Dunin's (1989) record from Sheki in NW Azerbaijan.

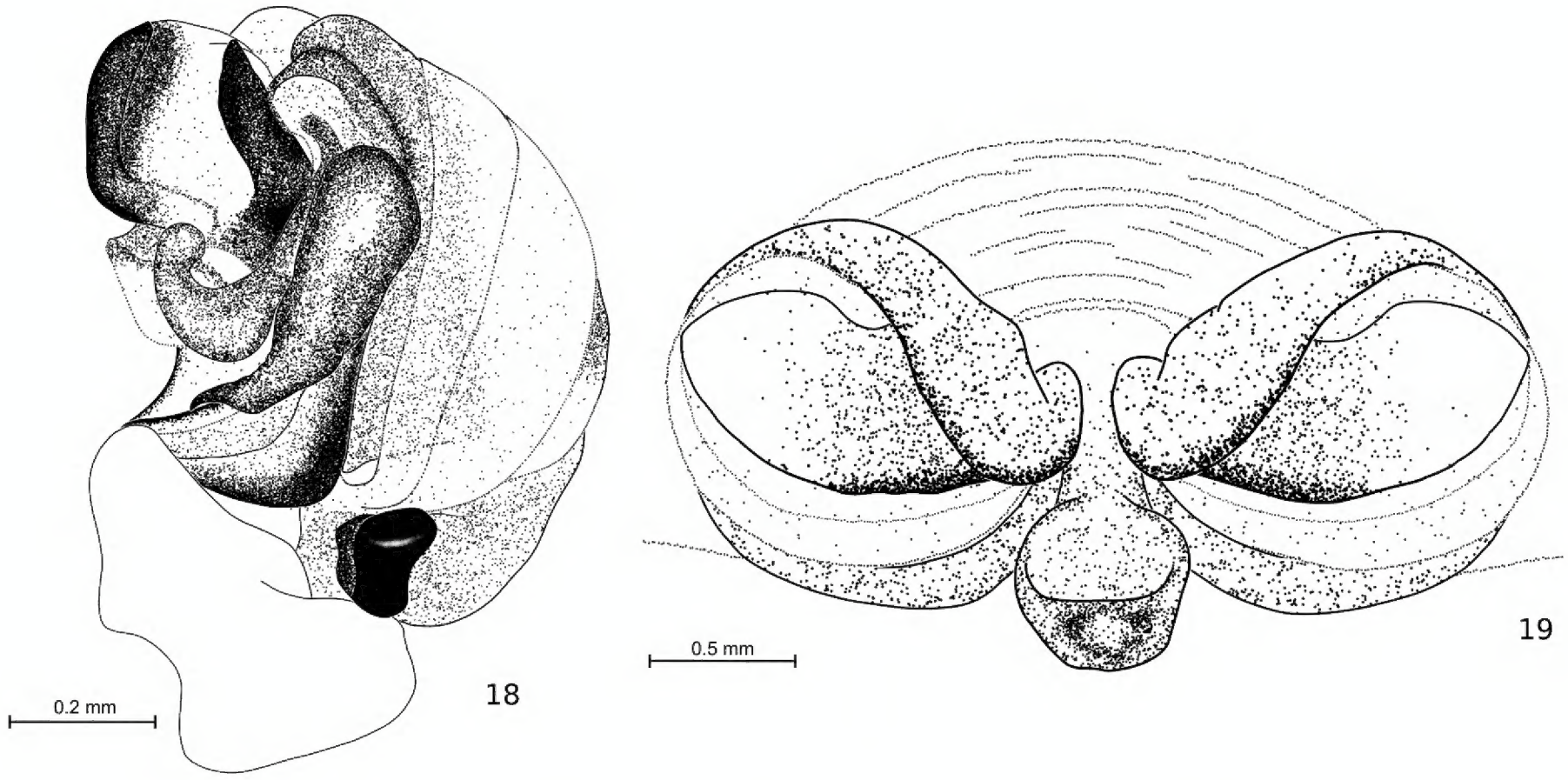
Hypsosinga albovittata Westring, 1851

GEORGIA • 1♀; Gori; N41.9862°, E44.1068°; 603 m a.s.l.; xerothermic slope at Gori Fortress, on Silybum sp.; leg. N. Bulbulashvili; 25 May 2021; CaBOL-ID 1010419 • 1♀; Dighomi village (Tbilisi); N41.7812°, E44.7024°; 734 m a.s.l.; heathland; leg. G. Makharadze; 06 June 2021; CaBOL-ID 1012923.

Remarks. This species is quite common in the Caucasus; the nearest published records are from Tskhinvali and Tbilisi (Pkhakadze 2006; Ponomarev and Komarov 2015). The specimens did not yield a genetic barcode.

Hypsosinga heri (Hahn, 1831)

GEORGIA • 1♀; Lake W of Tsavkisi (Trialeti Mountains); N41.68635°, E44.72152°; 1100 m a.s.l.; lake shore, in reed; leg. S. Otto; 12 May 2009; coll. Otto (KVS 393) • 1♀; Kolkheti National Park; N42.33802°, E41.61131°; 301 m



Figures 18–19. Araneidae, *Gibbaranea gibbosa*; left palpus (**18**: retrolateral view), epigyne (**19**: ventral view).

a.s.l.; leg. N. Bulbulashvili; 02 August 2022; CaBOL-ID 1030858 • 2♀♀; Kolkheti National Park; N42.33802°, E41.61131°; 301 m a.s.l.; leg. CaBOL team; 02 August 2022; CaBOL-IDs 1033174, 1033175.

Genetics. We obtained two identical barcodes from the specimens with CaBOL-IDs 1033174 and 1033175 (BOLD:AAZ9228) with the nearest neighbor in BOLD Systems being *H. heri* from Germany (BOLD:AAZ9228, p-dist. 0.46%)

Remarks. Epigyne morphology corresponds well to that of *H. heri*. The body of the specimen is lost from the sample (only the epigyne is left); determination notes by SO are: body length 3,73 mm; legs light yellow, prosoma bright with a white spot behind the ocular region; sternum brown, its anterior part brighter; abdomen bright with darker pairs of spots in the posterior half; venter black with white fringe. In Georgia, this species is known from some locations near the Black Sea and from Bakuriani near our location (Mcheidze 1997).

Hypsosinga pygmaea (Sundevall, 1831)

GEORGIA • 1♀; Kolkheti National Park near Poti; N42.14758°, E41.82526°; -1 m a.s.l.; Sphagnum bog near a forest, in the grass; leg. S. Otto; 17 May 2009; coll. Otto (KVS 401).

Remarks. This species is common in the Caucasus and Georgia (Mcheidze 1997; Pkhakadze 2006).

Hypsosinga sanguinea (C. L. Koch, 1844)

GEORGIA • 1♀, 1♂; Tbilisi (Dighomi urban-forest); N41.7699°, E44.7737°; 431 m a.s.l.; meadow, on vegetation near the ground; leg. N. Bulbulashvili and A. Seropian; 23 July 2021; CaBOL-IDs 1011679, 1011680.

Genetics. The barcode obtained from the specimen with CaBOL-ID 1011680 (BOLD:AAO2316) did not show any good matches, although the nearest neighbor in BOLD Systems is *H. sanguinea* from Finland (BOLD:ACF2545, p-dist. 4.78%). It should be noted that the specimens from Finland represent immature animals, making it impossible to check the validity of the determination via examination of copulatory organs.

Remarks. Both female and male specimens corresponded very well to the key provided by Nentwig et al. (2022). This species is common in the Caucasus and Georgia (Mcheidze 1997; Ponomarev and Komarov 2015).

Larinia bonneti Spassky, 1939

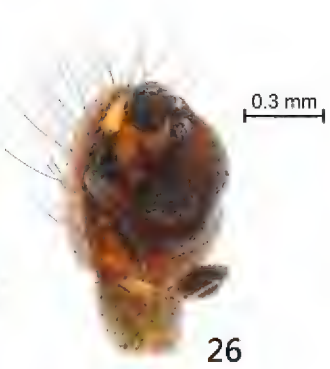
GEORGIA • 8♂♂, 4♀♀; Ispani II wetland near Kobuleti (Adjara region); N41.86339°, E41.78367°; 6 m a.s.l.; Sphagnum bog, in the field layer; leg. S. Otto; 22 May 2009; coll. Otto (KBS 212, KVS 412) • 1♀; Kolkheti National Park; N of Pichori River; N42.14758°, E41.82526°; -1 m a.s.l.; Sphagnum bog near the forest; leg. S. Otto; 17 May 2009; coll. Otto (KVS 399).

Remarks. This species is known from the Black Sea Coast in Georgia, near our locations (Mcheidze 1997; Marusik 1987).

Larinioides cornutus (Clerck, 1757)

GEORGIA • 1♂; Bughdasheni Managed Reserve; N41.1985°, E43.6884°; 2042 m a.s.l.; meadow, on vegetation near the lake shore; leg. N. Bulbulashvili and A. Seropian; 11 October 2021; CaBOL-ID 1018804 • 3♀♀, Kodistskaro; N42.0174°, E44.3496°; 709 m a.s.l.; floodplain, on vegetation; leg. N. Bulbulashvili, 25 August 2021; CaBOL-IDs 1012360, 1012372, 1012396 • 2♂♂, Kartsakhi; N41.1926°, E43.2411°; 1822 m a.s.l.; subalpine meadow, on vegetation; leg. L.-G. Japaridze, 05 July 2022; CaBOL-IDs 1026462, 1026463.

Genetics. We obtained two barcodes from the specimens with CaBOL-IDs 1018804, 1012360 (BOLD:AAA3682, p-dist. 1.22%). The nearest neighbor to our specimen



Figures 20–28. Araneidae, *Leviellus caspicus* (20–26); dorsal habitus (**20**: female; **21**: male), right palpus (images flipped horizontally, **22**: prolateral view; **23**: retrodorsal; **24**: retrolateral; **25**: ventral; **26**: proventral). *Leviellus stroemi* (27–28), female habitus (**27**: dorsal view) and venter (**28**: ventral view).

with CaBOL-ID 1012360 in BOLD Systems is *L. cornutus* from Poland (BOLD:AAA3682, p-dist. 0 %), while for CaBOL-ID 1018804 it is *L. cornutus* from Canada (BOLD:AAA3682, p-dist. 0.47%).

Remarks. *L. cornutus* is widely distributed and common in the Caucasus and Georgia and has been reported near our locations before (Mcheidze 1964, 1997).

Larinioides ixobolus (Thorell, 1873)

GEORGIA • 1♀; Gori; N41.9790°, E44.1059°; 592 m a.s.l.; on building wall; leg. N. Bulbulashvili; 01 September 2021; CaBOL-ID 1012420.

Genetics. The barcode obtained from the specimen with CaBOL-ID 1012420 (BOLD:AAO2591) was almost identical to the CO1 of *L. ixobolus* in BOLD Systems from Austria (BOLD:AAO2591, p-dist. 0.15%).

Remarks. Most locations of *L. ixobolus* are in the lowlands of Dagestan, but this species has been reported from the Khobi (Samegrelo-Zemo Svaneti) in Georgia before (Mcheidze 1997).

Larinioides patagiatus Clerck, 1757

GEORGIA • 1♀, 1♂; Uraveli gorge (Samtskhe-Javakheti region); N41.607791°, E43.04249°; 996 m a.s.l.; Mtkvari River bank; leg. A. Memishishi; 12 October 2022; CaBOL-IDs 1035236, 1035239 • 1♂(subadult).; 10 km SE of Sairme (Samtskhe-Javakheti region); N41.869111°, E42.793361°; 1687 m a.s.l.; meadow; leg. A. Memishishi; 11 October 2022; CaBOL-ID 1035237.

Remarks. Most locations of *L. ixobolus* are in the lowlands of Dagestan, but this species has been reported from the Khobi (Samegrelo-Zemo Svaneti) in Georgia before (Mcheidze 1997).

Larinioides suspicax (O. Pickard-Cambridge, 1876)

GEORGIA • 1♂; Tabatskuri Lake (Samtskhe-Javakheti region); N41.64434°, E43.59848°; 2000 m a.s.l.; lake shore, on pine tree; leg. S. Otto; 21 August 2007; coll. Otto (KVS 262) • 1♀; near Gamarjveba E of Tbilisi; N41.63903°, E45.01393°; 460 m a.s.l.; on reed at pond; leg. S. Otto; 8 September 2006; coll. Otto (KVS 4) • 1♀; Near Gamarjveba E of Tbilisi; N41.63903°, E45.01393°; 460 m a.s.l.; on reed at pond; leg. S. Otto; 6 August 2006; coll. Otto (KBS 9) • 2♀♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; pseudosteppe wasteland; leg. S. Otto; 11 August 2007; coll. Otto (KBS 114) • 4♂♂, 3♀♀; Tabatskuri Lake (Samtskhe-Javakheti region); N41.64434°, E43.59848°; 2000 m a.s.l.; meadow in pine plantation; leg. S. Otto; 21 August 2007; coll. Otto (KBS 126, KBS 127) • 2♂♂, 3♀♀, Tabatskuri Lake (Samtskhe-Javakheti region); N41.66333°, E43.64444°; 2000 m a.s.l.; alpine grassland; leg. S. Otto; 21 August 2007; coll. Otto (KBS 176) • 1♀; Kolkheti National Park; N of Pichori River; N42.14758°, E41.82526°; -1 m a.s.l.; Sphagnum bog near the forest; leg. S. Otto; 17 May 2009; coll. Otto (KBS 208) • 2♀♀; Ispani II wetland near Kobuleti (Adjara region); N41.86339°, E41.78367°; 6 m a.s.l.; Sphagnum bog, in the field layer; leg. S. Otto; 19 May 2009; coll. Otto (KBS 211) • 1♂; Saghamo Lake; N41.2941°, E43.7309°; 2006 m a.s.l.; meadow, Paravani River bank, on vegetation near water; leg. A. Seropian; 11 October 2021; CaBOL-ID 1018680.

Remarks. This species is widely distributed in the Caucasus and Georgia. The specimens did not yield genetic barcode information.

***Leviellus caspicus* (Simon, 1889)

GEORGIA • 1♂, 1♀; Gori; N41.98033°, E44.10599°; 593 m a.s.l.; in apartment; leg. N. Bulbulashvili; 2 March 2021; CaBOL-IDs 1009760 (Figs 21–26, 29, 34), 1010360 (Figs 20, 30–33, 35) • 1♀; Tbilisi; N41.77477°, E44.79387°; 451 m a.s.l.; in building; leg. A. Seropian; 4 March 2021; CaBOL-ID 1010056.

Genetics. We obtained two barcodes from the specimens with CaBOL-IDs 1010360 and 1010056 (BOLD:AAI3228) with nearly identical CO1 (p-dist. 0.76%). The closest neighbor in BOLD Systems is *L. caspicus* (mean p-dist. 1.3% p-dist) with an Early-release status, thus we could not get any information on the specimen's country of origin.

Remarks. Somatic characters, measurements, allometrics, and morphology of copulatory organs (Figs 20–26, 29–35, Suppl. material 1) matched well with those of *L. caspicus* given in Levi (1974:281). The endogyne is figured for the first time for this species. This is the westernmost and first record of *L. caspicus* in the Caucasus Region.

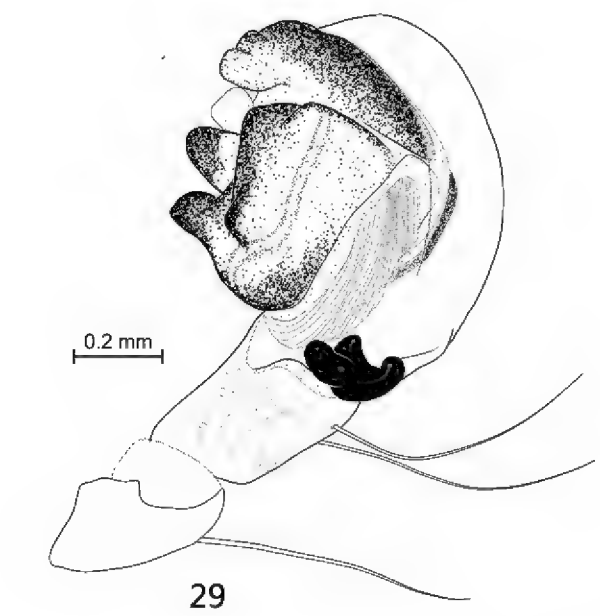
Leviellus stroemi (Thorell, 1870)

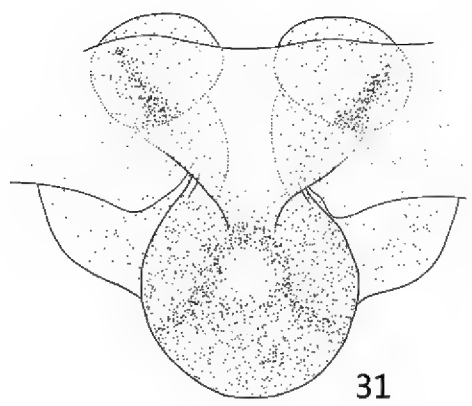
GEORGIA • 1♀; Abastumani; N41.7879°, E42.8486°; 1433 m a.s.l.; coniferous forest, under Pinus sp. bark; leg. N. Bulbulashvili; 11 October 2022; CaBOL-ID 10131241 (Figs 27–28).

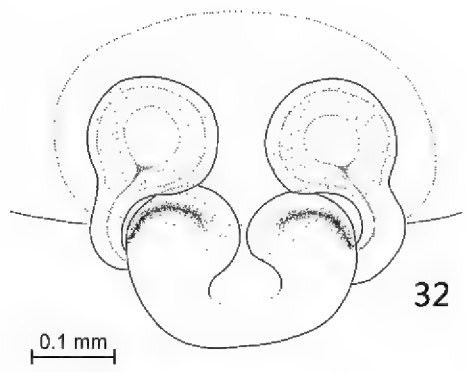
Remarks. Appearance and copulatory organs matched well with those of *L. stroemi* given in Locket and Millidge (1953) and Roberts (1995) (Figs 27-28). After Ponomarev et al. (2012) reported the species for the first time from the Caucasus (Adygea), our record is the second for the Caucasus and the first one in the South Caucasus and Georgia.

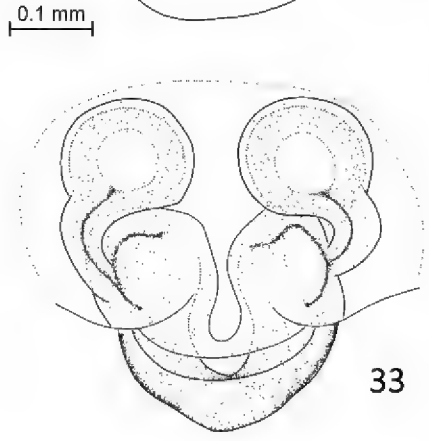
Mangora acalypha (Walckenaer, 1802)

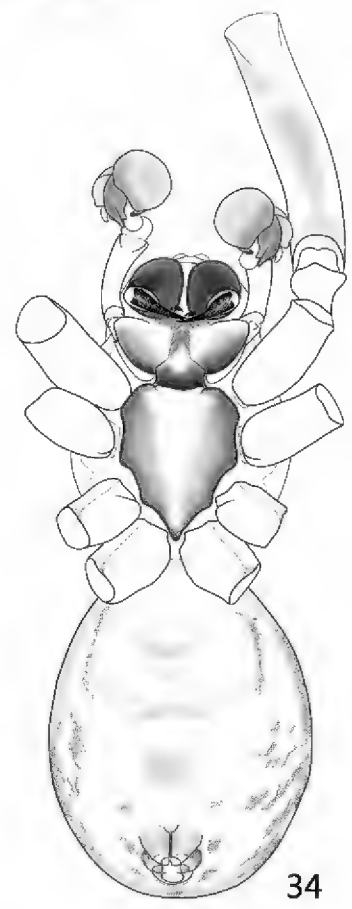
GEORGIA • 2♀♀; David Gareja Monastery; N41.44088°, E45.37847°; 700 m a.s.l.; xerothermic thorn shrubs; leg. S. Otto; 13 August 2007; coll. Otto (KBS 120) • 1♀; Chakvistavi, Mtirala National Park (Adjara region), 1 km E of visitor center; N41.67632°, E41.87472°; 300 m a.s.l.; river bed, in ferns; leg. S. Otto; 7 July 2010; coll. Otto (KBS 185) • 1♀; Ispani II wetland near Kobuleti (Adjara region); N41.86339°, E41.78367°; 6 m a.s.l.; Sphagnum bog, in the field layer; leg. S. Otto; 19 May 2009; coll. Otto (KBS 211) • 2♂♂, 3♀♀; Ispani II wetland near Kobuleti (Adjara region); N41.86339°, E41.78367°; 6 m a.s.l.; Sphagnum bog, in the field layer; leg. S. Otto; 22 May 2009; coll. Otto (KBS 212, KVS 411) • 2♂♂, 5♀♀; Zeraboseli, Kintrishi National Park; N41.73701°, E41.98446°; 400 m a.s.l.; in forest, field layer; leg. S. Otto; 2 June 2009; coll. Otto (KBS 218) • 1♂; Batsara Strict Nature Reserve; N42.2240°, E45.3004°; 817 m a.s.l.; meadow at deciduous forest; leg. N. Bulbulashvili; 28 May 2022; CaBOL-ID 1025680.

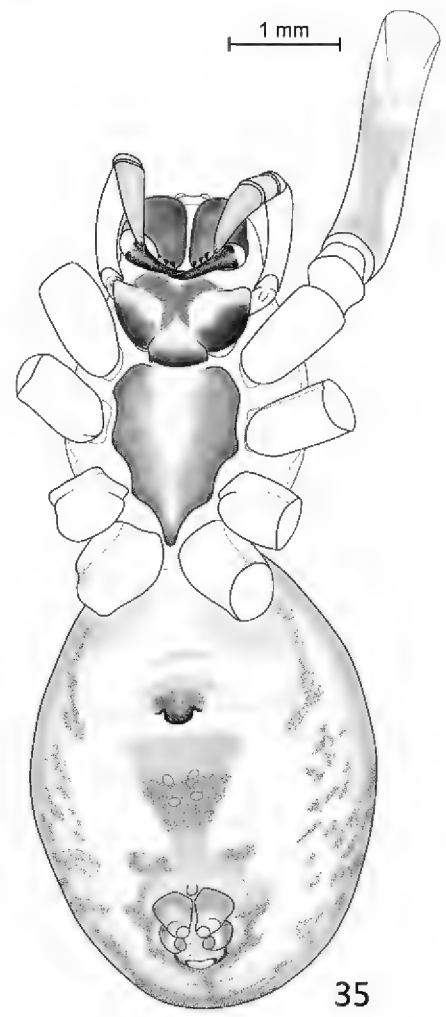












Figures 29–35. Araneidae, *Leviellus caspicus*; right palpus (image flipped horizontally; **29**: retrolateral view); epigyne (**30**: ventral view; **31**: caudal; **32**: dorsal; **33**: caudo-dorsal); male habitus (**34**: ventral view); female habitus (**36**: ventral view).

Neoscona adianta (Walckenaer, 1802)

GEORGIA • 2♀♀; Jvari Monastery, Mtskheta; N41.83853°, E44.73446°; 600 m a.s.l.; xerothermic shrubland, on Paliurus shrubs; leg. S. Otto; 7 August 2007; coll. Otto (KBS 119) • 3♀♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; pseudosteppe garden; leg. T. Shetekauri; 1 June 2007; coll. Otto (KBS 134).

Neoscona spasskyi (Brignoli, 1983)

GEORGIA • 1♂, 2♀♀; Tbilisi; N41.77166°, E44.76875°; 436 m a.s.l.; highway, on green line between lanes; leg. N. Bulbulashvili; 22 August 2022; CaBOL-ID, 1012458, 1010379, 1012457 (Figs 36–38) • 1♀; Tbilisi; N41.767967°, E44.767719°; 440 m a.s.l.; heathland; leg. A. Seropian; 17 September 2019; ex coll. Otto (KVS 552); CaBOL-ID 1004119.

Genetics. The barcodes obtained from the specimens with CaBOL-IDs 1012457 (BOLD:) and 1012458 (BOLD:) were nearly identical (p-dist. 0.15%). This species is not present in BOLD as we provide the first COI sequences. The nearest neighbor in BOLD Systems is Asian *Neoscona scylla* from Pakistan (BOLD:ACI8762, mean p-dist. 8.1%).

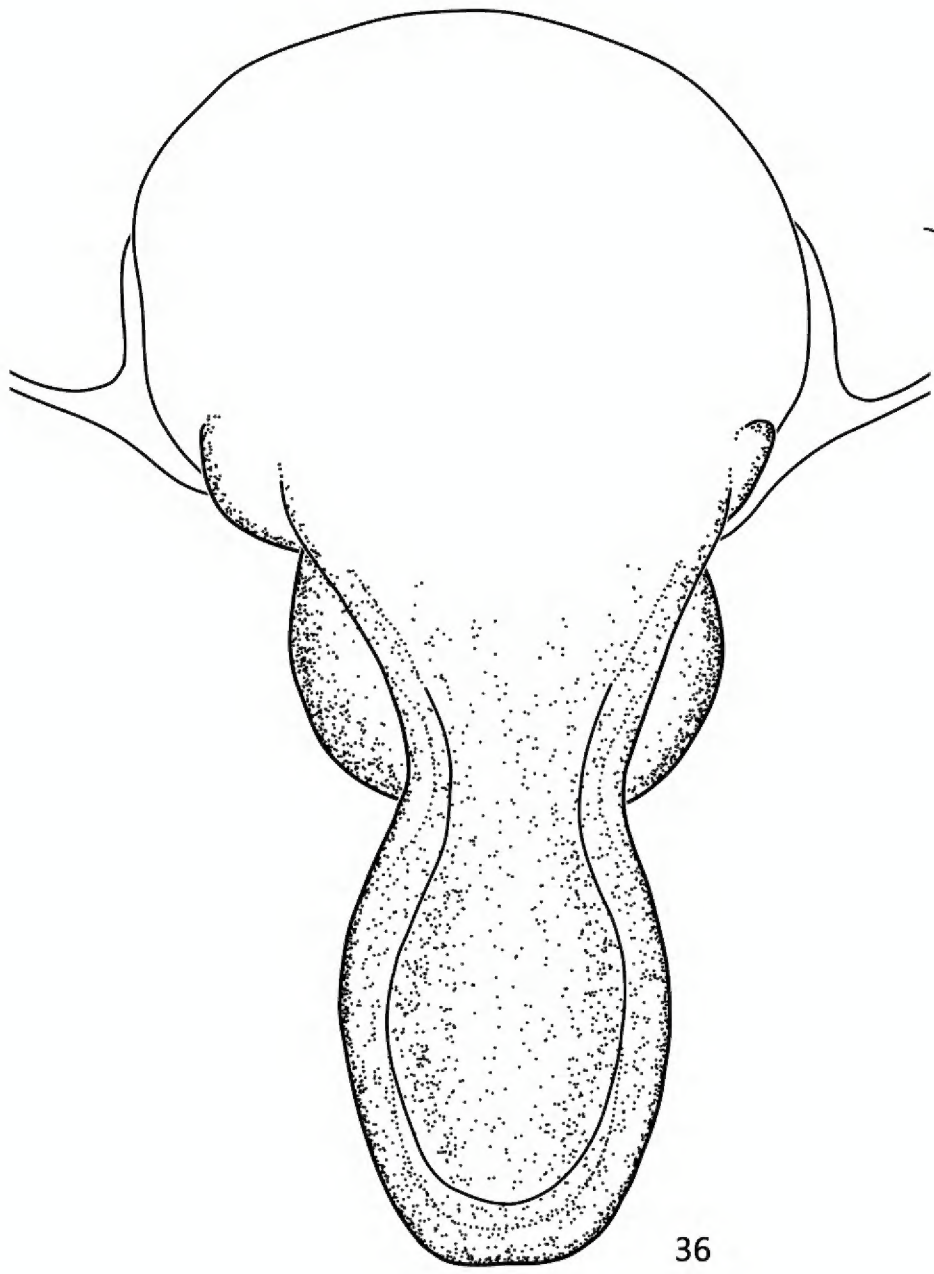
Remarks. The previous record of *N. theisi* (Walckenaer, 1841) by Zamani et al. (2020) (CaBOL-ID 1004119) based on a photograph of a single female refers to *N. spasskyi* instead (Zamani et al. 2022), which therefore represents the first record of this species in Georgia (Zamani et al. 2022). To facilitate further research of this species and extend our knowledge of its morphology, we present here drawings and photographs of the epigyne (Figs 36–38; Suppl. material 1).

Nuctenea umbratica (Clerck, 1757)

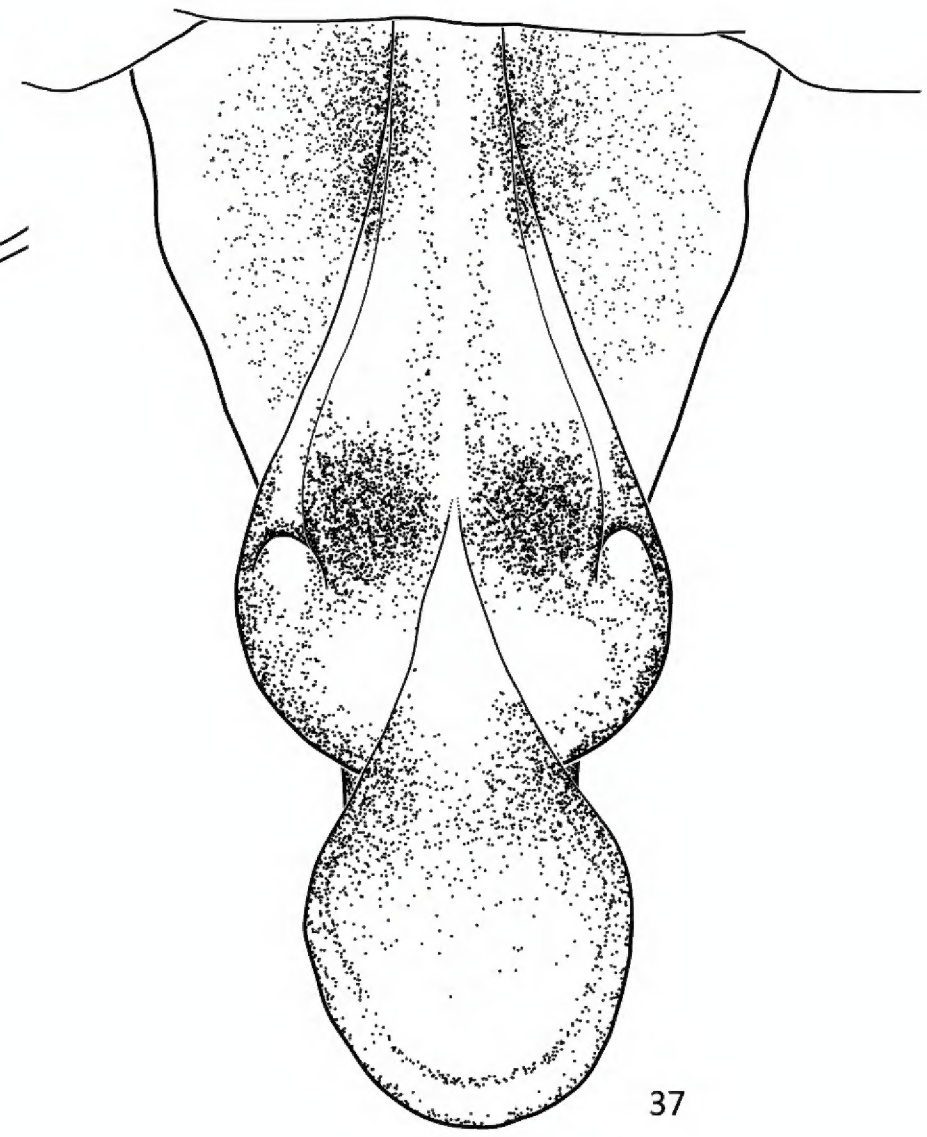
GEORGIA • 1♀; Gamarjveba E of Tbilisi; N41.64348°, E45.00259°; 450 m a.s.l.; pseudosteppe garden; leg. T. Shetekauri; 1 June 2007, ex coll. Otto (KVS 295); CaBOL-ID 1004122 • 2♂♂; Bakuriani (Trialeti Mountains); N41.74874°, E43.27760°; 1700 m a.s.l.; in house; leg. S. Otto; 24 July 2010; coll. Otto (KBS 179); CaBOL-IDs 1004120, 1004121 • 1♂; Gori; N41.9790°, E44.1059°; 592 m a.s.l.; on the building wall; leg. N. Bulbulashvili; 1 September 2021; CaBOL-ID 1012408 • 1♂; Kvariati; N41.54185°, E41.56470°; 78 m a.s.l.; on the building wall; leg. A. Memishishi; 8 November 2021; CaBOL-ID 1018154.

Genetics. The sequence obtained from the specimen with CaBOL-ID 1012408 (BOLD:AAG8519) is identical to the sequence of *N. umbratica* from Austria (BOLD:AAG8519).

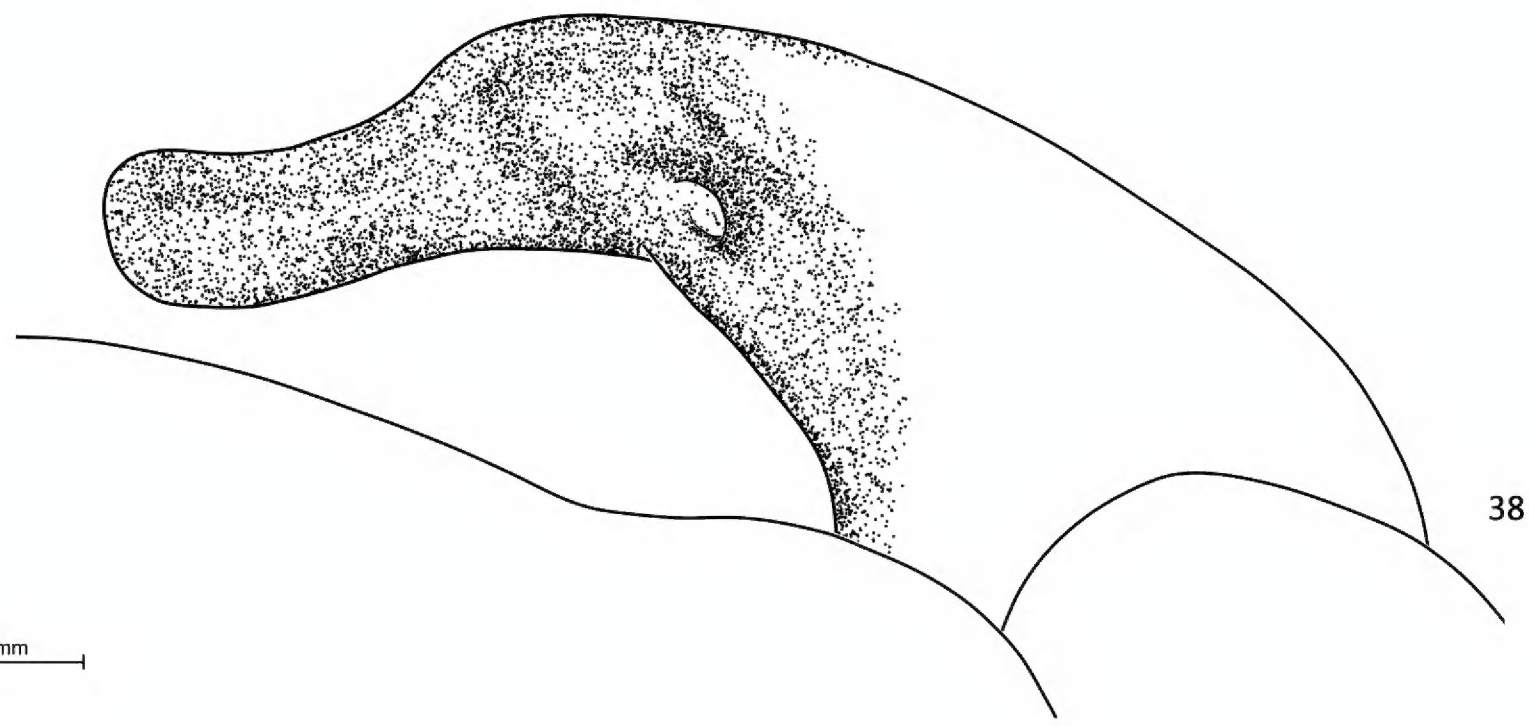
Remarks. Very abundant species that covers the territory of Georgia from West to East. In nature, it constructs webs on trees with loose bark, using the space between tree trunk and bark as shelter. *Nuctenea umbratica* exhibits certain tendencies towards synanthropy, as the spider can be observed



36



37



38

0.1 mm

Figures 36–38. Araneidae, *Neoscona spasskyi*; epigyne (**36**: ventral view; **37**: dorsal; **38**: lateral, in situ).

on buildings and other man-made structures. Due to its appearance, the species is known in Georgia under the name "flat spider" (ბრტყელი ობობა).

Singa nitidula C. L. Koch, 1844

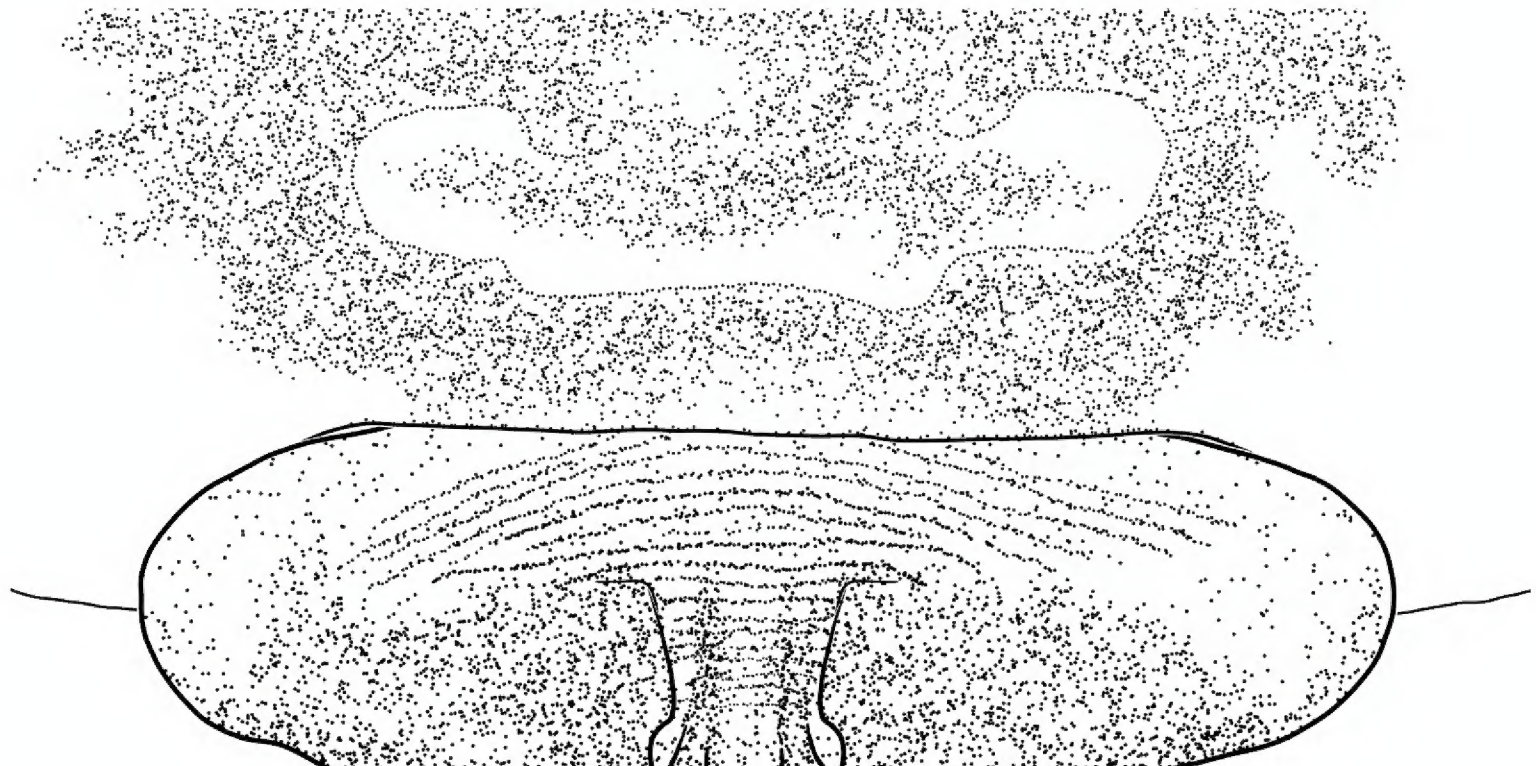
GEORGIA • 1♀; Kazreti; N41.4054°; E44.4218°, 611m a.s.l.; sweep netting at Mashavera River bank; leg. E. Arsenashvili; 25 October 2022; CaBOL-ID 1032228.

Genetics. We obtained the barcode from the specimen with CaBOL-ID 1032228 (BOLD:AAP3140) with the closest neighbor in BOLD Systems being *S. nitidula* from Slovenia (BOLD:AAP3140, p-dist. 0.31%).

**Singa semiatra* L. Koch, 1867

GEORGIA • 1♀; Dalis Mta Reservoir; N41.26850°; E45.8959°, 400 m a.s.l.; hand collecting; leg. B. Müller; 31 May 2022; ZFMK-TIS-8015353 (Figs 39–42).

Remarks. This species is known from several locations across the entire range of the North Caucasus between Krasnodar and Dagestan (Ponomarev et al. 2014; Ponomarev et al. 2017; Ponomarev et al. 2019; Ponomarev et al. 2021). This is the first record of this species in the South Caucasus and Georgia. The collected specimen corresponds well in both habitus and copulatory organs to *S. semiatra*. We provide details of the epigyne and its underlying structures



Figures 39–42. Araneidae, *Singa semiatra*; epigyne (**39**: in situ, ventral view; **40**: in situ, caudal view; **41**: prepared, cleared, antero-dorsal view; **42**: prepared, cleared, caudal view).

(Figs 39–42) and habitus photos (see Suppl. material 1) of this rarely recorded species.

Zygiella montana (C. L. Koch, 1834)

GEORGIA • 2♀♀; Khone; N42.5742°, E45.2370°; 2100 m a.s.l.; in hut; leg. S. Otto; 2 September 2006, ex coll. Otto (KVS 33a; 33b); CaBOL-IDs 1004123, 1004124.

Atypidae

Atypus muralis Bertkau, 1890

GEORGIA • 1♀; Dighomi Village (8 km E of Tbilisi); N41.7789°, E44.7003°; 765 m a.s.l.; heathland, in burrow; leg. A. Seropian; 15. September 2021; CaBOL-ID 1010030 • 1juv: Lechkhumi, Isunderi; N42.5504°, E42.6496°; 740 m a.s.l.; burrow in meadow; leg. A. Zukakishvili; 9 August 2021; CaBOL-ID 1021021.

Genetics. We obtained the barcode from the specimen with CaBOL-ID 1010030 (BOLD:AFB6034) with the closest neighbor in BOLD Systems being *A. muralis* from Bulgaria (p-dist. 7.25%) with a private status.

Remarks. Bulgarian *A. muralis* barcode is the only one of the species available in BOLD Systems, but at the same time, the validity of the determination is questionable, since two more species – *A. affinis* Eichwald, 1830 and *A. piceus* (Sulzer, 1776) are also reported from Bulgaria (Blagoev et al. 2018), while the only species distributed throughout the Caucasus region is *A. muralis* (Otto 2022).

Discussion

Hand collecting has been the main collecting method in the history of Caucasian arachnology since the 19th century, and the vast majority of the more than three hundred studies on spiders in the Caucasus are based on specimens collected by hand or with simple collecting methods such as sweep netting or litter sifting (see references in Otto 2022). Collecting spiders in a more systematic and comparable way has been rare in the past (Mikhailov and Mikhailova 2002), but it seems to have gain more popularity in recent years among researchers and in large research projects, e.g., through transect studies with Malaise traps in the national parks of Lagodekhi and Kintrishi (Otto and Japoshvili 2018; Thormann et al. 2019). The first results from these studies recorded interesting and rare species as well as species new to science (Mikhailov et al. 2017; Marusik et al. 2020).

However, the advent of more elaborate collecting methods and large multi-national research projects like CaBOL do not mean the end of hand collecting and basic collecting methods in the study of spiders in the Caucasus. On the contrary, our results proved again that interesting and rare species can be recorded with relatively low effort, even as first records in the Caucasus Ecoregion and the country of Georgia. Such records come from remote and understudied regions and locations like Samtskhe-Javakheti, Kakheti, Gori, and Abastumani (i.e., *Aculepeira talishia*, *Leviellus caspicus*, *L. stroemi*) and the protected area of Kintrishi National Park (*Pireneitega armeniaca*); but even in the seemingly well-studied capital Tbilisi and in its surroundings, first records for the country and even the Caucasus are still possible (i.e. *Lycosoides coarctata*, *Gibbaranea gibbosa*, *L. caspicus*).

In providing barcode information for 36 of the 214 specimens (16.8 %) and 24 of the 51 species (47 %), this study further proves that simple spider collections can effectively contribute to national barcoding inventories, such as the one currently undertaken in Georgia by the CaBOL Project. This will contribute significantly to the knowledge of species and genetic diversity of spiders and invertebrates as a whole in the Caucasus, which is still far from being thoroughly described and understood. Among the obtained COI barcoding results, several cases have taken place, when identification in BOLD Systems via COI was not straightforward due to interspecific lumps (i.e. cases of *Aculepeira talishia* (Zawadsky, 1902)/*A. ceropegia* (Walckenaer, 1802) (p-dist. 1.22%)) or large (> p-dist. 3.0%) intraspecific genetic distances (i.e., cases of *Persiscape gideoni* (Levy, 1996) (mean p-dist. 6.2%), *Pireneitega spasskyi* (Charitonov, 1946) (p-dist. 3.91%), *Hypsosinga sanguinea* (C. L. Koch, 1844) (p-dist. 4.78%), and *Atypus muralis* Bertkau, 1890 (p-dist. 7.25%)).

The upcoming second and larger part of these supplements to the arachnid fauna of Georgia intends to cover records in the families between the Cheiracanthiidae and Zodariidae. It will provide further valuable insights into the composition and distribution of the spider fauna in Georgia as well as important additions to the national and international barcode repositories.

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Supplementary material 1

The image collection

Authors: Seropian et al. (2023)

Data type: .docx

Explanation note: The image collection which was the basis for the drawings and measurements referenced in the main text. Some somatic measurements are included as well.

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